SWS Silicones Corporation
ADRIAN, MICHIGAN 49221 • TELEPHONE (517) 263-5711

February 24, 1983

US EPA RECORDS CENTER REGION 5
1005180

Chief Engineer
Michigan Department of Natural Resources
Surface Water Quality Division
P. O. Box 30028
Lansing, Michigan 48909

Re: SWS Silicones Corporation,
NPDES Permit MI 0026034,
Hydrogeological Investigation

Gentlemen:

This letter responds to Special Condition number 6 (six) of our NPDES permit, and is a submittal of findings concerning the Hydrogeological Investigation of the "old drum burial site" area of our plant.

Please refer to our letter to the Department of Natural Resources dated September 10, 1982 and to the letter from R. E. Schrameck of the Department of Natural Resources dated November 9, 1982.

Attached is the following data:

1. Stauffer inter-office memo from B. S. McClellan, Senior Hydrogeologist, dated 2/14/83, and entitled "Estimate of Mass Loading, Phase II Hydrogeologic Investigation, Old Disposal Area, SWS, Adrian, Michigan."

2. Table I, "M-Well Analysis," which is the result of sampling the four "M" wells on January 5, 1983.

3. Gilbert/Commonwealth study, dated August, 1982, and entitled "Hydrogeologic Investigation of Disposal Area, SWS Silicones Corporation, Adrian, Michigan." Note that portions of this report were submitted to the Department of Natural Resources in our September 10, 1982 letter.

This report completes the phase II Hydrogeological Investigation, required by our NPDES permit. Please refer to our letter dated December 23, 1982, concerning the findings of the evaporation-settling pond portion of this study.

Yours truly,

SWS SILICONES CORPORATION

Gordon C. Philbrook

Gordon C. Philbrook
Environmental Control Coordinator

GCP:pb 83-30, certified

cc: J. Calamungi
S. Eldredge, DNR, Jackson District; certified
B. S. McClellan*
T. J. Sayers*
R. E. Schrameck, DNR, Grosse Ile; certified*
*No G/C report

bcc: (no G/C report)
J. M. Barancin
B. P. Dennis
G. L. Ford
H. Kim
G. H. Meyer, Meyer & Kirk
G. R. Wolf

Stauffer CHEMICALS

INTER-OFFICE CORRESPONDENCE

Westport

Adrian

B.S. McClellan
Sr. Hydrogeologist

2/14/83

G.C. Philbrook

cc: J. Calamungi
G.L. Ford
D. McGrade
T.J. Sayers

Estimate of Mass Loading
Phase II Hydrogeologic
Investigation
Old Disposal Area, SWS
Adrian, Michigan

This report presents an estimate of mass loading from the old disposal area to the river. This work has been conducted in response to a request for calculation of the "flow volume of the affected ground water" and "a projection of the anticipated spread through the ground" made in the November 9, 1982 letter from R.E. Schrameck of Michigan DNR.

The data presented in this report is based on information provided in the August, 1982 report Hydrogeologic Investigation of Disposal Area, prepared by Gilbert/Commonwealth and the results of analyses performed on ground-water samples collected from the "M" series wells on January 5, 1982. The August, 1982 report by Gilbert/Commonwealth was previously submitted to the Michigan DNR in September, 1982 and is here after referred to as the G/C report. The January, 1983 analytical results are attached.

In order to estimate the mass loading it was necessary to estimate the discharge rate (volume/unit time) of ground water which flows past and under the disposal area and discharges to the river or adjoining swampy flood plain area. The discharge rate was estimated using the expression

$$Q = KIA$$

Where:

Q = discharge rate in unit volume per unit time
K = the hydraulic conductivity
I = the hydraulic gradient
A = the cross-section area through which flow occurs

The hydraulic conductivity and hydraulic gradient are provided in the G/C report and are 6.0×10^{-3} cm/sec and 0.019 respectfully. The cross-sectional area was determined by calculating the area of a vertical plane in the upper ten feet of the saturated zone, downgradient of the disposal area and perpendicular to the observed ground-water flow direction. Using Figure 2 of the G/C report as a reference, this vertical plane is located along a line which intersects well M-3 and a point located approximately 169 feet downgradient of well M-2 at the Figure 2 grid intersection N 48,356 and E 25,689.

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FEB 16 1983

FORM 0032-000-00A

Based on the observed concentrations the maximum spread of contamination appears to be about 400 feet. That is to say, the width of the plume downgradient of the disposal area at the vertical plane is about 400 feet. The plume width or outer limit is defined by the groundwater flow lines which pass through wells M-2 and M-3, and intersect the vertical plane.

The flow lines which pass through M-2 and M-3 are considered to represent the outer limits of the plume based on the observed concentration in the three downgradient wells. The elevated concentrations were observed in well M-4, the center well. In both M-2 and M-3 only one chemical found in M-4 was detected. The detections in M-3 and M-2 were two to three orders of magnitude less respectfully. Based on the ground water contouring on Figure 2 of the G/C report it appears that the width of this plume does not change significantly prior to discharge along the river flood plain.

Using this maximum plume width the cross-sectional area through which ground water passes is about 4,000 square feet. Plugging this cross-sectional area into the expression above the ground-water discharge rate is approximately 9,659.6 gpd.

To compute the estimated mass loading the concentrations for each chemical in each of the three downgradient wells was averaged. The resulting mass loading in pounds per day is shown in Table 1.

TABLE 1

Estimated Mass Loading

Chemical	Average Concentration Mg/L	Mass Loading Pounds Per Day
1,1 dichloroethane	0.053	0.004
t,1,2 dichloroethylene	0.345	0.028
1,1,1 trichloroethane	0.650	0.052
trichlorothylene	0.247	0.020
tetrachloroethylene	0.060	0.005
Total Chlorinated Organics	1.355	0.109
trimethyl silanol	5.017	0.401

Considering that the chemical concentrations observed and number of detections made in the ground-water sample from M-4 was significantly greater than the other wells, an estimate of mass loading using the concentrations detected in well M-4 was also computed. Based on the distribution of concentrations observed in the three downgradient wells, the greater concentrations are considered representative of ground water in the immediate area (50 feet radius) of M-4. For this reason the width of the plume of greater concentration has been assumed to be 100 feet wide. Using the assumed plume width the estimated ground-water discharge rate is

approximately 2,414.9 gpd. The resulting mass loading in pounds per day for the area around M-4 is shown in Table 2.

TABLE 2

Estimated Mass Loading
(Concentrations At M-4)

Chemical	Concentration M-4 Mg/L	Mass Loading Pound Per Day
1,1 dichloroethane	0.16	0.003
t,1,2 dichloroethylene	1.02	0.020
1,1,1 trichloroethane	1.95	0.039
trichloroethylene	0.74	0.015
tetrachloroethylene	0.18	0.004
Total Chlorinated Organics	4.05	0.081
trimethyl silanol	15.0	0.300

Once again based on the observed ground-water flow condition, it should be anticipated that the width of the plume at the measuring point used in this report and at the discharge area should be the same.

If you have any questions please call.

B.S. McClellan

BSM018:dm

Attachment

SWS SILICONES CORPORATION

Table I

M Well Analysis

The results from the analysis of the four "M" well samples collected on January 5, 1983 are as follows:

	mg/l			
	M-1	M-2	M-3	M-4
1,1 dichloroethane	N.D.	N.D.	N.D.	0.16
t-1,2 dichloroethylene	N.D.	N.D.	0.02	1.02
1,1,1 trichloroethane	N.D.	N.D.	N.D.	1.95
trichloethylene	N.D.	N.D.	N.D.	0.74
tetrachloroethylene	N.D.	N.D.	N.D.	0.18
trimethyl silanol	N.D.	0.05	N.D.	15
TOC	--	--	--	30

1. We also did analyses of spiked samples. The results were 18% to 58% higher than the theoretical values for all the hydrocarbons, except for tetrachloroethylene, which were 19% to 48% lower than the theoretical values.

2. Refer to letter dated September 10, 1982 for other analyses.

G. C. Philbrook
1/13/83

SWS Silicones Corporation
ADRIAN, MICHIGAN 49221 • TELEPHONE (517) 263-5711

September 10, 1982

Mr. Robert J. Courchaine
Chief, Water Quality Division
Michigan Department of Natural Resources
P. O. Box 30028
Lansing, Michigan 48909

Re: SWS Silicones Corporation
NPDES Permit MI 0026034

Dear Mr. Courchaine:

This letter responds to Special Condition number 6 (six) of our NPDES permit, and is a submittal of some findings concerning the Hydrogeological Investigation.

This report concerns the "old drum burial site" area of our plant. Four wells were installed by Gilbert/Commonwealth Inc. as shown on attached drawings 1 and 2, and well logs M-1 thru M-4.

These wells were sampled on July 1 and July 21, 1982. The results are attached.

The second area involved in the Hydrogeological Investigation concerns the study of the perched aquifer and near surface aquifer by the old evaporation-settling (black) pond. This information is still being assembled and we expect to submit a report of our findings in the near future.

We are requesting that drawings 1 and 2, and memos dated August 18, 1982 and August 20, 1982 remain confidential.

Very truly yours,

SWS SILICONES CORPORATION

Gordon C. Philbrook

Gordon C. Philbrook
Environmental Control Coordinator

GCP:pb 82-216, certified
Enclosures (8)

cc: L. B. Bruner
J. Calamungi
G. L. Ford
B. S. McClellan
T. J. Sayers
R. E. Schrameck, DNR, District 1; certified

bcc: J. M. Barancin
H. Kim
G. R. Wolf

INTER-OFFICE CORRESPONDENCE

SWS Silicones Corporation

To G. R. Wolf

Copy to G. C. Philbrook

Date August 18, 1982

From B. P. Dennis

Subject "M" Well Analysis

The results from the analysis of the four "M" well samples collected on July 1, 1982 are tabulated below:

	M-1	M-2	M-3	M-4
Copper, mg/l	0.02	0.02	0.01	0.04
Zinc, mg/l	0.06	0.05	0.02	0.15
TOC mg/l	8	6	5	32
Specific Conductance, Mhos/Cm	$7.69X10^{-4}$ @76.0°F	$5.55X10^{-4}$ @76.0°F	$8.0X10^{-4}$ @76.0°F	$1.66X10^{-3}$ @76.1°F
Silicone, mg/l	<0.5	<0.5	<0.5	<0.5
pH	7.8	7.7	7.6	7.7
Organic halide, mg/l	0.020 0.022	0.011 0.014	0.061 0.060 0.063 0.058	0.76 0.69 0.98 0.96

B. P. Dennis

BPD:cw

INTER-OFFICE CORRESPONDENCE

SWS Silicones Corporation

To G. R. Wolf

Copy to G. C. Philbrook

Date August 20, 1982

From B. P. Dennis

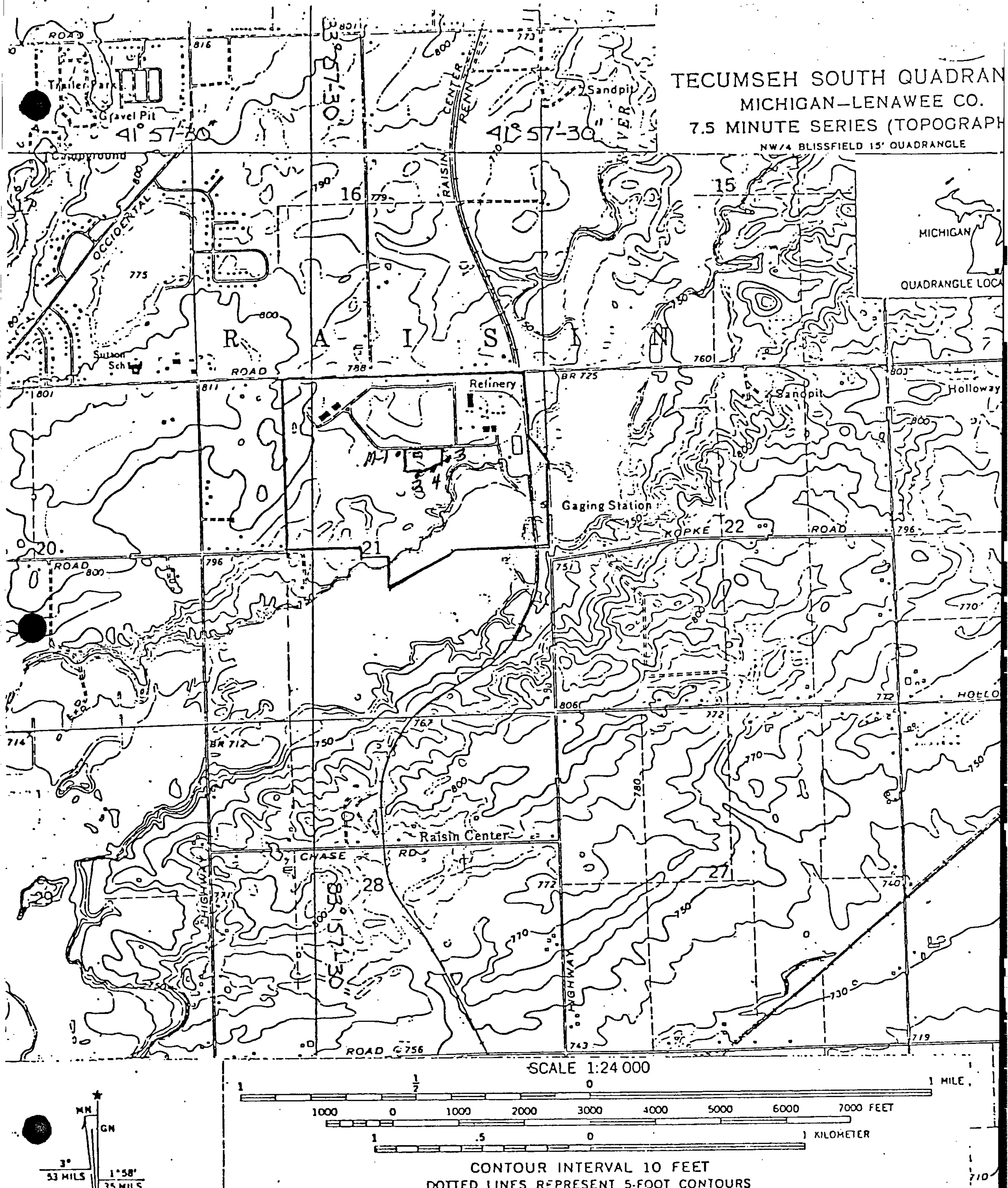
Subject Well Analysis

The four monitoring wells in the dump site area were resampled on July 21st and analyzed for Total Organic Halogen (TOH) and Total Silicone. The results are shown below:

WELL NO.	TOH, mg/l	SILICONE mg/l
M-1	0.007	<0.5
	0.008	
M-2	0.011	<0.5
	0.013	
M-3	0.041	<0.5
	0.043	
	0.059	
	0.058	
M-4	1.1	<0.5
	1.1	
	1.0	
	1.1	

B. P. Dennis

BPD:cw

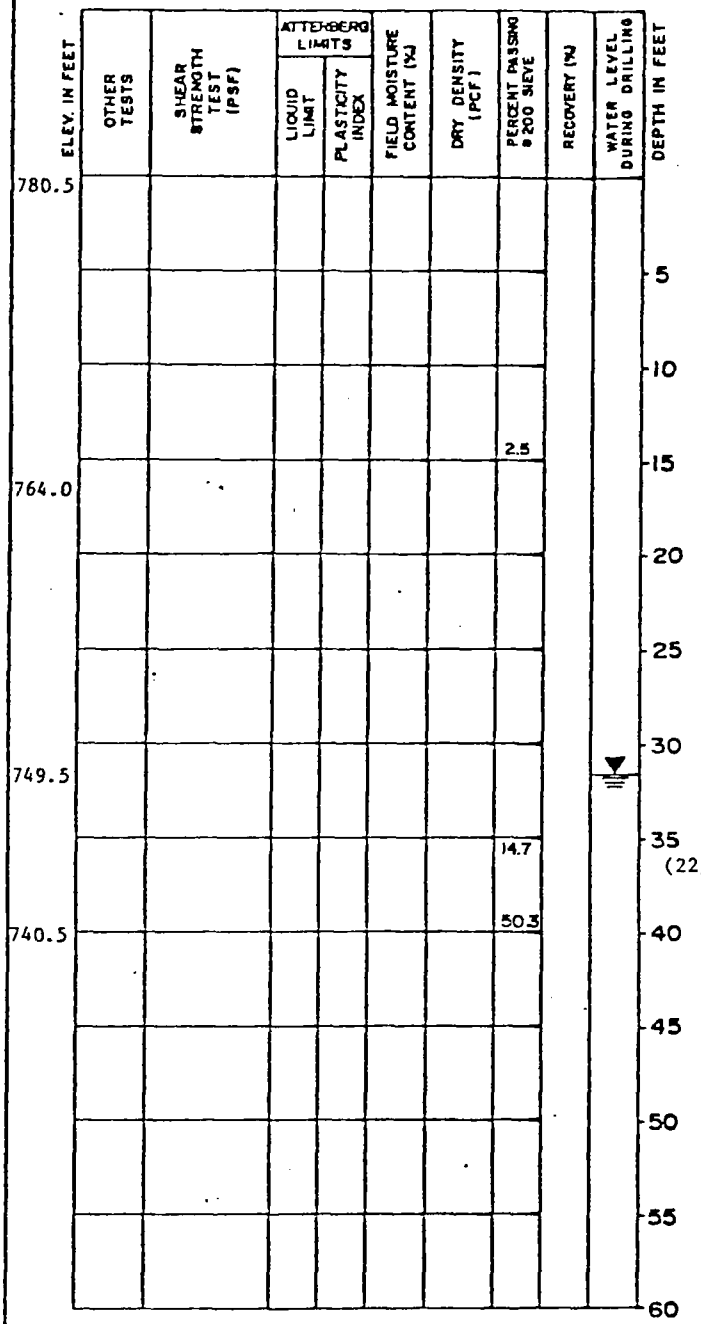


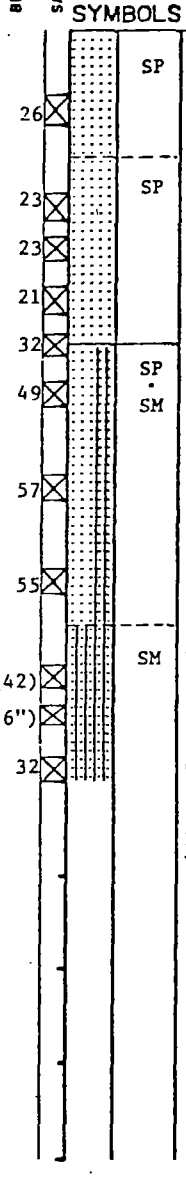
SWS SILICONES CORPORATION

Drawing No. 1

BORING M-1

SURFACE ELEVATION 780.5' NGVD
PLANT COORDINATES: N48,826
E25,337





SYMBOLS	DESCRIPTION
SP	Fill, brown fine to medium SAND, trace coarse sand and fine gravel, concrete fragments noted.
SP	Brown fine to coarse SAND, trace fine gravel, occasional thin layer of coarse sand noted. (medium dense)
SP • SM	Light brown fine SAND, trace to little silt, dry. (dense to very dense)
	Grades to moist.
SM	Light brown fine SAND, little silt, saturated. (dense)
	Grades to fine SAND and silt.
	Boring terminated at 40.0' on 6/08/82. Water level encountered at approx. 32.5' during drilling.

NOTES:

1. A 2-inch PVC monitoring well was installed in the borehole with 4 feet of Johnson, continuous slot screen set between depths of 34.5 to 38.5 feet. Slot size is 0.006 inch. A complete installation summary is given in Table 1.

2. Blow counts in parentheses are not representative of the in situ soils.

SWS SILICONES CORPORATION
ADRIAN, MICHIGAN

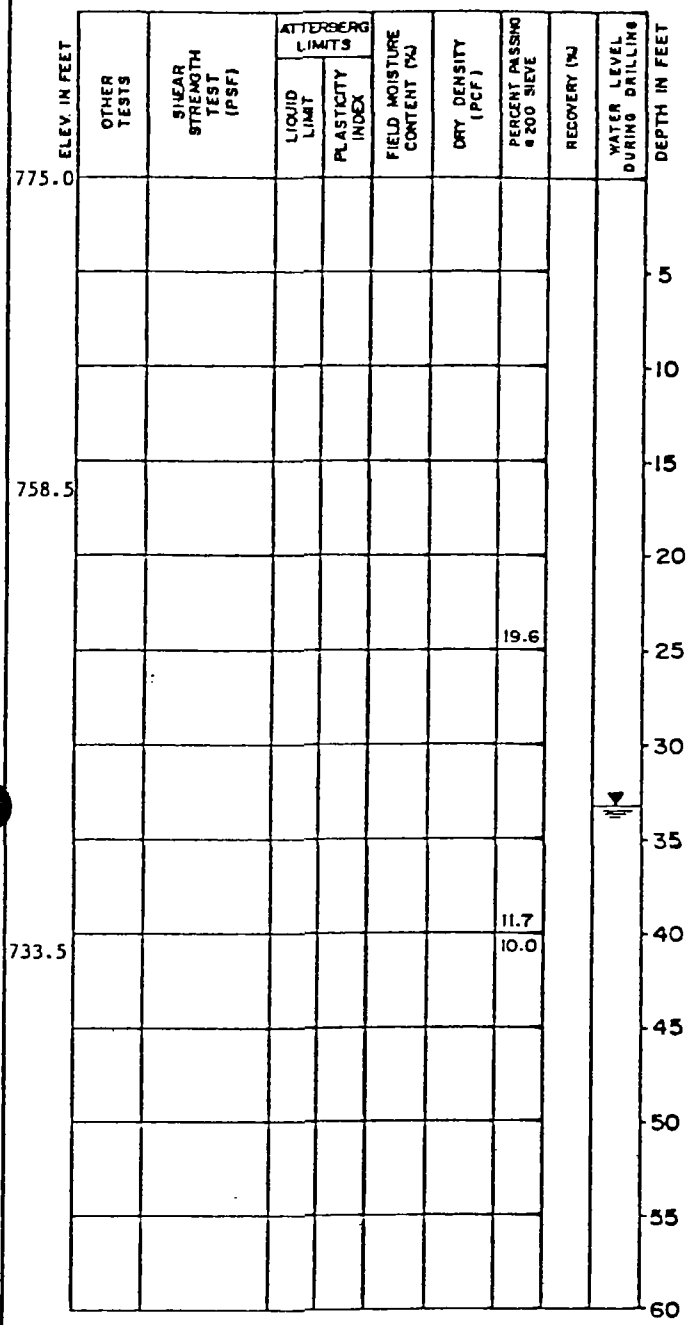
Gilbert Commonwealth Companies

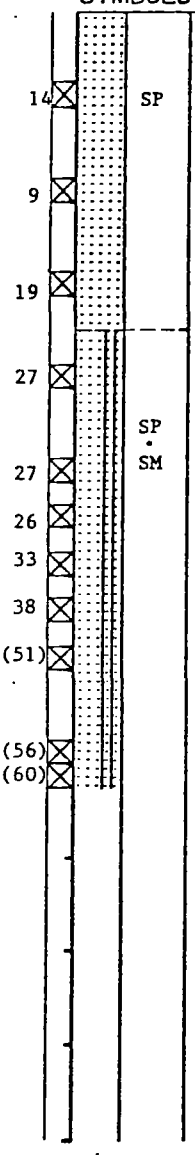
LOG OF
BORING M-1

FIGURE 5

BORING M-2

SURFACE ELEVATION 775.0' NGVD
PLANT COORDINATES: N 48,483
E 25,572





DESCRIPTION

Brown fine to coarse SAND, little silt or clay, trace fine gravel (topsoil).

Light brown fine to coarse SAND. (medium dense)

Gray-brown fine SAND, trace to little silt, cross-bedded, dry. (medium dense to dense)

Grades to moist.

Saturated.

Grades to tan to orange-brown. Grades to gray, less silt.

Boring terminated at 41.5' on 6/09/82. Water level encountered at approx. 33.3' during drilling.

NOTES:

1. A 2-inch PVC monitoring well was installed in the borehole with 5 feet of Johnson, continuous slot screen set between depths of 35.4' to 40.4 feet. Slot size is 0.006 inch. A complete installation summary is given in Table 1.

2. Blow counts in parentheses are not representative of the in situ soils.

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ADRIAN, MICHIGAN

Gilbert Commonwealth Companies

LOG OF BORING M-2

FIGURE 6

BORING M-3

SURFACE ELEVATION 770.9' NGVD
PLANT COORDINATES: N 48,647
E 25,998

ELEV. IN FEET	OTHER TESTS	SHEAR STRENGTH TEST (PSF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FIELD MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING #200 SIEVE	RECOVERY (%)	WATER LEVEL DURING DRILLING	DEPTH IN FEET
770.9										0
763.4										5
		PN=2500	24.7	11.2			87.3			10
		PN=1500-2000	23.6	0.2			94.8			15
754.7										20
							59.6			
748.5										25
										30
										35
731.4							12.9			40
										45
										50
										55
										60

BLOW COUNT	SAMPLES	SYMBOLS	DESCRIPTION
20		SP	Brown medium to coarse SAND, trace fine gravel, coarse gravel noted. (medium dense)
42		ML • CL	Interbedded tan to orange-brown SILT, some fine sand; tan SILT, some clay, little fine to medium sand; and gray clayey SILT to SILTY CLAY, trace fine sand; occasional silt or fine sand partings; contacts are gradational; high moisture content, but not saturated. (very stiff)
22			
18			
(57)		ML • SM	Tan SILT, some fine sand, moist to dry.
(148)			Grades to fine SAND, some silt, dry.
44		SP • SM	Light brown fine SAND, little silt, cross-bedded, dry. (dense to very dense)
69			Saturated
27/8"			
39			Grades to tan, a few thin layers of medium sand noted.
105			Grades tan to yellow-brown, little silt. (extremely dense)
			Boring terminated at 39.5' on 6/09/82. Water level encountered at appox. 31.5' during drilling.

NOTES:

1. A 2-inch PVC monitoring well was installed in the borehole with 5 feet of Johnson, continuous slot screen set between depths of 34.4 to 39.4 feet. Slot size is 0.006 inch. A complete installation summary is given in Table 1.

2. Blow counts in parentheses are not representative of the in situ soils.

SWS SILICONES CORPORATION
ADRIAN, MICHIGAN

Gilbert Commonwealth Companies

LOG OF
BORING M-3

FIGURE 7

BORING M-4

SURFACE ELEVATION 771.4' NGVD
PLANT COORDINATES: N 48,556
E 25,827

ELEV. IN FEET	OTHER TESTS	SHEAR STRENGTH TEST (PSF)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FIELD MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING #200 SIEVE	RECOVERY (%)	WATER LEVEL DURING DRILLING	DEPTH IN FEET	BLOW COUNT	SAMPLES	SYMBOLS	DESCRIPTION
771.4										0				(No topsoil)
											17		SP	Brown medium to coarse SAND, trace fine gravel, trace silt or clay. (medium dense)
764.4										5				
							99.2				(41)		ML · CL	Interbedded tan to orange-brown SILT, no sand; tan to orange-brown SILT, trace to some fine sand; gray-brown SILTY CLAY, plastic; mottled gray-brown and orange-brown clayey SILT, trace fine to coarse sand with dry silt partings; contacts are gradational; high moisture content.
										10	(28)			
		PN-3750-	23.4	5.9			87.7				(33)			
		4500 PN-3750- 4500	18.0	1.8			92.7			15	(30)			
753.9													ML · SM	Tan to orange-brown SILT, some fine sand grading to fine SAND, some silt, moist.
751.9										20	83/6"			
											(133)		SP · SM	Tan to light brown SAND, little silt, moist to dry
							36.8			25	42			Grades to light gray-brown some silt, cross-bedded, dry. (dense to very dense)
										30	(46)			Grades to tan, trace to little silt.
											41			Saturated
							11.4			35	58			Grades to gray-brown.
731.4										40	62			Boring terminated at 40.0' on 6/10/82. Water level encountered at appox. 32.0' during drilling.
										45				
										50				
										55				
										60				

NOTES:

1. A 2-inch PVC monitoring well was installed in the borehole with 5 feet of Johnson, continuous slot screen set between depths of 35.2 to 40.2 feet. Slot size is 0.006 inch. A complete installation summary is given in Table 1.

2. Blow counts in parentheses are not representative of the in situ soils.

SWS SILICONES CORPORATION
ADRIAN, MICHIGAN

Gilbert Commonwealth Companies

LOG OF
BORING M-4

FIGURE 8

SWS Silicones Corporation
ADRIAN, MICHIGAN 49221 • TELEPHONE (517) 263-5711

7/82

Mr. Roy Schrameck, District Engineer
Michigan Department of Natural Resources
Water Quality Division, District #1
9311 Groh Road
Grosse Ile, Michigan 48138

Re: SWS Silicones Corporation
NPDES Permit No. MI0026034
Hydrogeological Study

Dear Mr. Schrameck,

Enclosed is a summary of the analyses of the nine monitoring wells around our Old Evaporation Pond (Black Pond), as specified in our letter to you on January 5, 1982, and confirmed by your letter of April 8, 1982. The sampling was done on June 9, 1982.

The mass loading (in pounds per unit time) has not yet been calculated by our Senior Hydrogeologist, Mr. Bruce McClellan. We have made arrangements with an Engineering firm to do the permeability testing of the nine wells. We hope to send you the mass loading results in July.

For your reference, a sketch of the well locations is also attached. These are labeled OW-1 through OW-5. Note that IS is No. 1 Shallow, and ID is No. 1 Deep, etc.

Yours very truly,

SWS SILICONES CORPORATION

Gordon C. Philbrook
Environmental Control Coordinator

GCP:pb 82-164, certified, attachs.

cc: Chief Engineer, MDNR, Lansing; certified
J. Calamungi*
T. J. Sayers*
B. S. McClellan*
G. L. Ford*

*no attachs.

INTER-OFFICE CORRESPONDENCE

SWS Silicones Corporation

To G. R. WOLF

Copy to G. C. PHILBROOK

Date JUNE 25, 1982

From B. P. DENNIS

Subject ANALYSIS OF WATER FROM TEST WELLS

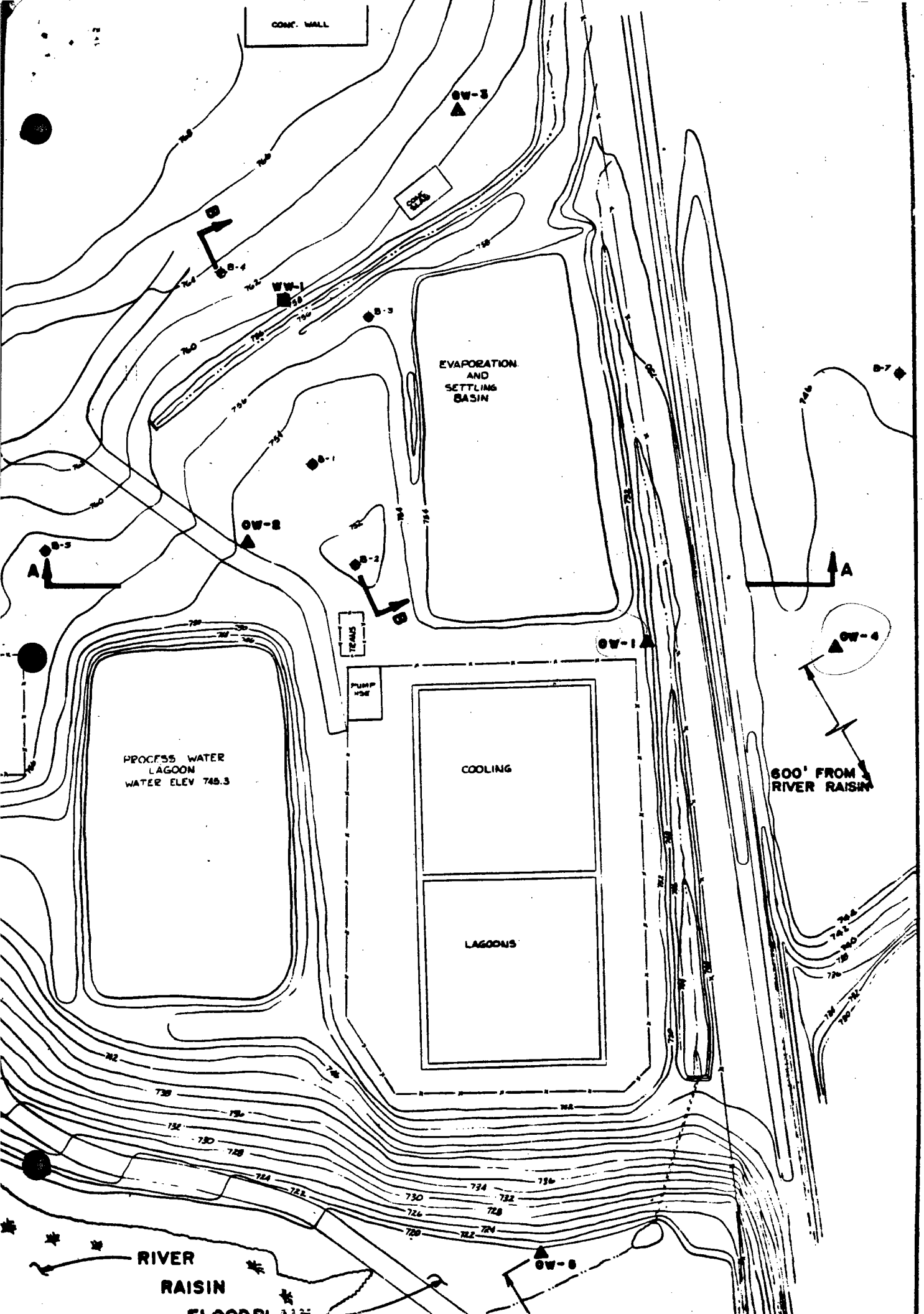
The analysis of five of the six parameters requested on the well samples is complete. The results are tabulated below:

Well Number	TOC mg/l	Chloride mg/l	1,1-dichloro-ethane, mg/l	t-1,2-dichloro-ethylene, mg/l	1,1,1 tri-chloroethane, mg/l
1S	30	950	17	ND	3.7
1D	13	855	ND	ND	0.13
2S	29	440	ND	0.74	0.25
2D	5	240	ND	ND	ND
3S	14	190	ND	ND	0.30
3D	5	174	ND	ND	ND
4S	20	1280	ND	0.80	3
4D	8	273	ND	0.04	0.08
5	14	370	ND	0.14	0.25

The n-butyl-phthalate analyses will be complete in about one week.

B. P. Dennis

BPD:cw


CONC. WALL
MW-3
B
B-4
MW-1
B-3
EVAPORATION AND SETTLING BASIN
B-7
B-1
MW-2
A
B-5
B-2
B
TRANS
PUMP HSE
MW-1
MW-4
PROCESS WATER LAGOON WATER ELEV 745.3
COOLING
LAGOONS
600' FROM RIVER RAISIN
RIVER RAISIN
MW-5